

CLAIMS

WHAT IS CLAIMED IS:

1. A stack-type semiconductor package having one or more semiconductor devices contained therein comprising:

5 a printed circuit board (PCB) having a circuit pattern;

a first semiconductor memory device (first device) stacked on the PCB and electrically connected to the PCB circuit pattern;

10 a conductive frame having first terminals and second terminals, wherein the first terminals are electrically connected to the PCB circuit pattern;

15 a second semiconductor memory device (second device) stacked on the conductive frame over the first device and electrically connected to second terminals of the conductive frame,

wherein the second device is electrically connected to the PCB circuit pattern and the first device via the conductive frame.

20 2. The stack-type semiconductor package of claim 1, wherein each of the first and second devices is a ball grid array type stack package (BGA package) having a plurality of solder balls at its lower surface.

25 3. The stack-type semiconductor package of claim 2, wherein the conductive frame is a lead frame having a plurality of elongated lead parts, each elongated lead part having a ball land at one

end and a lead section at the other end,

wherein the ball lands comprise the second terminals and are arranged in a predetermined pattern to correspond to the solder balls of the second device; and

5 further wherein the lead sections comprise the first terminals and are electrically connected to the PCB circuit pattern.

4. The stack-type semiconductor package of claim 3, wherein the PCB further comprises:

10 pads for receiving the first terminals of the conductive frame to electrically connect the second device to the PCB circuit pattern and to the first device;

ball lands for receiving solder balls of the first device to electrically connect the first device to the PCB circuit pattern; and

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a plurality of PCB solder balls to electrically connect the PCB to an external device.

5. The stack-type semiconductor package of claim 4, wherein each of the PCB pads are formed with a conductive bump.

20 6. The stack-type semiconductor package of claim 5, wherein the conductive bump is made from a conductive material including Au or Ni and has a height of about 1 μm to about 100 μm .

7. The stack-type semiconductor package of claim 4, wherein the PCB circuit pattern is made from a conductive material including

25 Cu.

8. The stack-type semiconductor package of claim 4, wherein the conductive frame is made from a conductive material including an alloy 42 or Cu.

9. The stack-type semiconductor package of claim 8, wherein the conductive frame is coated with a conductive material to enhance the electrical connection between the PCB and the first or second device, wherein the conductive material for coating includes Sn and one or any combination of the elements selected from the group consisting of Pb, Ag, In, Bi, Au, Zn, Cu, Pd, and Ni.

10. The stack-type semiconductor package of claim 2, wherein the conductive frame is a tape automated bonding (TAB) tape,

wherein the first terminals are formed at the two ends of the TAB tape and are electrically connected to the PCB circuit pattern; and

further wherein the second terminals are formed at the middle portion of the TAB tape and are arranged in a predetermined pattern to electrically connect to the second device.

11. The stack-type semiconductor package of claim 10, wherein

the PCB comprises:

pads for receiving the first terminals of the conductive frame to electrically connect the second device to the PCB circuit pattern and to the first device; and

ball lands for receiving solder balls of the first device to electrically connect the first device and the PCB

circuit pattern; and

a plurality of PCB solder balls to electrically connect the PCB to an external device.

12. The stack-type semiconductor package of claim 11, wherein
5 the first terminals of the TAB tape are electrically connected to the PCB pads by a thermal compression process or a supersonic compression process.

13. The stack-type semiconductor package of claim 12, wherein
the middle portion of the TAB tape is adhesive by having a
10 thermoplastic resin, an adhesive glass, or an adhesive tape on its surface.

14. The stack-type semiconductor package of claim 4, wherein the
plurality of solder balls of the first and second devices and the
plurality of PCB solder balls are made from a conductive material
15 including Sn and one or any combination of the elements selected from the group consisting of Pb, Ag, In, Bi, Au, Zn, and Cu.

15. The stack-type semiconductor package of claim 14, wherein
the size of each of the plurality of solder balls of the first
and second devices and the plurality of PCB solder balls is
20 between about 100 μm and about 1 μm .

16. The stack-type semiconductor package of claim 1, wherein the
first device is a thin-small-outline-package-type semiconductor
package (TSOP package) having a plurality of TSOP leads for
electrical connection to the PCB circuit pattern, and the second
25 device is a ball grid array type stack package (BGA package)

having a plurality of solder balls at its lower surface.

17. The stack-type semiconductor package of claim 16, wherein the conductive frame is a lead frame having a plurality of elongated lead parts, each elongated lead part having a ball land at one end and a lead section at the other end,

wherein the ball lands comprise the second terminals and are arranged in a predetermined pattern to correspond to the solder balls of the second device; and

further wherein the lead sections comprise the first terminals and are electrically connected to the PCB circuit pattern.

18. The stack-type semiconductor package of claim 17, wherein the PCB further comprises:

first pads for receiving the first terminals of the conductive frame to electrically connect the second device to the PCB circuit pattern and to the first device;

second pads for receiving the TSOP terminals of the first device to electrically connect the first device to the PCB circuit pattern; and

a plurality of PCB solder balls to electrically connect the PCB to an external device.

19. The stack-type semiconductor package of claim 18, wherein each of the PCB pads are formed with a conductive bump.

20. The stack-type semiconductor package of claim 19, wherein

the conductive bump is made from a conductive material including

Au or Ni and has a height of about 1 μm to about 100 μm .

21. The stack-type semiconductor package of claim 18, wherein the PCB circuit pattern is made from a conductive material including Cu.

5 22. The stack-type semiconductor package of claim 18, wherein the conductive frame is made from a conductive material including an alloy 42 or Cu.

23. The stack-type semiconductor package of claim 22, wherein the conductive frame is coated with a conductive material to
10 enhance the electrical connection between the PCB and the first or second device, wherein the conductive material for coating includes Sn and one or any combination of the elements selected from the group consisting of Pb, Ag, In, Bi, Au, Zn, Cu, Pd, and Ni.

15 24. The stack-type semiconductor package of claim 16, wherein the conductive frame is a tape automated bonding (TAB) tape,

wherein the first terminals are formed at the two ends of the TAB tape and are electrically connected to the PCB circuit pattern; and

20 further wherein the second terminals are formed at the middle portion of the TAB tape and are arranged in a predetermined pattern to electrically connect to the second device.

25 25. The stack-type semiconductor package of claim 24, wherein the PCB comprises:

first pads for receiving the first terminals of the conductive frame to electrically connect the second device to the PCB circuit pattern and to the first device; and

ball lands for receiving solder balls of the first device to electrically connect the first device and the PCB circuit pattern.

a plurality of solder balls to electrically connect the PCB to an external device.

26. The stack-type semiconductor package of claim 25, wherein the first terminals of the TAB tape are electrically connected to the PCB pads by a thermal compression process or a supersonic compression process.

27. The stack-type semiconductor package of claim 26, wherein the middle portion of the TAB tape is adhesive by having a thermoplastic resin, an adhesive glass, or an adhesive tape on its surface.

28. The stack-type semiconductor package of claim 18, wherein the plurality of solder balls of the first and second devices and the plurality of PCB solder balls are made from a conductive material including Sn and one or any combination of the elements selected from the group consisting of Pb, Ag, In, Bi, Au, Zn, and Cu.

29. A stack-type semiconductor package comprising:

a printed circuit board (PCB) having a circuit pattern, wherein one or more semiconductor devices are stackable on

the PCB;

a first semiconductor memory package (first package) stacked on the PCB and electrically connected to the PCB circuit pattern;

5 a second semiconductor memory package (second package) stacked above the first package; and

means for providing electrical connection between the second package and the PCB circuit pattern and between the second package and the first package.

10 30. The stack-type semiconductor package of claim 29, wherein the second package is a ball grid array type semiconductor package (BGA package) and the first package is either another BGA package or a thin-small-outline-package-type semiconductor package.

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